

- 15 -

WHAT IS CLAIMED IS:

1. A method of processing a series of frames for displaying on a display having a first modulator disposed to illuminate a second modulator, the method comprising:
 - 5 (a) receiving a key frame image;
 - (b) calculating a key frame first modulation signal based on the key frame image;
 - (c) calculating a key frame luminance map corresponding to light incident on the second modulator when the first modulator is driven by the key frame first modulation signal; and,
 - 10 (d) for each of a plurality of frames in the series of frames:
 - (i) receiving a current frame image;
 - (ii) determining a current frame second modulation signal based on the current frame image and the key frame luminance map; and,
 - 15 (iii) selecting the key frame first modulation signal to be a current frame first modulation signal.
- 20 2. A method according to claim 1 wherein step (d) comprises:
 - (iv) returning to step (a) after the plurality of frames.
3. A method according to claim 2 wherein the plurality of frames comprises a predetermined number of frames.

25

- 16 -

4. A method according to claim 2 wherein calculating the current frame second modulation signal comprises:
- 5 comparing a plurality of pixels of the current frame second modulation signal with a second modulator range on a pixel by pixel basis; and,
- updating the key frame first modulation signal and key frame luminance map if the pixels of the current frame second modulation signal are outside the second modulator range for a threshold number of pixels.
- 10
5. A method according to claim 4 wherein updating the key frame first modulation signal and key frame luminance map comprises:
- updating portions of the key frame first modulation signal and key frame luminance map which effect pixels for
- 15 which the current frame second modulation signal is outside the second modulator range.
6. A method according to claim 4 wherein updating the key frame first modulation signal and key frame luminance map comprises:
- 20 calculating the key frame first modulation signal using the current frame image as the key frame image; and
- calculating an approximation of the key frame luminance map.
- 25
7. A method according to claim 4 wherein updating the key frame first modulation signal and key frame luminance map comprises:
- selecting a standard key frame first modulation signal and luminance map for use as interim key frame parameters; and,
- 30 updating the key frame first modulation signal and key frame luminance map while at least one current frame is being processed with the interim key frame parameters.

- 17 -

8. A method according to claim 7 wherein the standard key frame comprises a frame wherein the first modulator is driven at a constant percentage of full intensity across a display area.
- 5 9. A method according to claim 7 wherein the standard key frame comprises a frame wherein the first modulator is driven at full intensity across a display area.
- 10 10. A method according to claim 7 wherein the standard key frame comprises a frame wherein the first modulator is driven at a constant percentage of full intensity across a selected portion of a display area.
- 15 11. A method according to claim 7 wherein the standard key frame comprises a frame wherein the first modulator is driven at full intensity across a selected portion of a display area.
- 20 12. A method according to claim 7 wherein the standard key frame comprises a previously processed key frame.
- 25 13. A method according to claim 2 wherein calculating the current frame second modulation signal comprises:
 - comparing a plurality of pixels of the current frame second modulation signal with a second modulator range on a pixel by pixel basis; and,
 - updating the key frame first modulation signal and key frame luminance map if an average amount by which the pixels of the current frame second modulation signal are outside the second modulator range exceeds a predetermined threshold.
- 30

- 18 -

14. A method according to claim 2 wherein calculating the current frame second modulation signal comprises:
- 5 comparing a plurality of pixels of the current frame second modulation signal with a second modulator range on a pixel by pixel basis; and,
- updating the key frame first modulation signal and key frame luminance map if a cumulative amount by which the pixels of the current frame second modulation signal are outside the second modulator range exceeds a
- 10 predetermined threshold.
15. A method according to claim 2 wherein calculating the current frame second modulation signal comprises:
- 15 comparing a plurality of pixels of the current frame second modulation signal with a second modulator range on a pixel by pixel basis; and,
- updating the key frame first modulation signal and key frame luminance map if an amount by which at least one of the pixels of the current frame second modulation
- 20 signal is outside the second modulator range exceeds a predetermined threshold.
16. A method according to claim 2 comprising receiving at least one future key frame image and calculating a future key frame first
- 25 modulation signal and luminance map while the plurality of frames are being processed.

- 19 -

17. A method according to claim 1 wherein calculating the current frame second modulation signal comprises:
- 5 comparing a plurality of pixels of the current frame second modulation signal with a second modulator range on a pixel by pixel basis; and,
- updating the key frame first modulation signal and key frame luminance map if the pixels of the current frame second modulation signal are outside the second modulator range for a threshold number of pixels.
- 10
18. A method according to claim 17 wherein updating the key frame first modulation signal and key frame luminance map comprises:
- updating portions of the key frame first modulation signal and key frame luminance map which effect pixels for
- 15 which the current frame second modulation signal is outside the second modulator range.
19. A method according to claim 17 wherein updating the key frame first modulation signal and key frame luminance map comprises:
- 20 calculating the key frame first modulation signal using the current frame image as the key frame image; and
- calculating an approximation of the key frame luminance map.
- 25
20. A method according to claim 17 wherein updating the key frame first modulation signal and key frame luminance map comprises:
- selecting a standard key frame first modulation signal and luminance map for use as interim key frame parameters; and,
- 30 updating the key frame first modulation signal and key frame luminance map while at least one current frame is being processed with the interim key frame parameters.

- 20 -

21. A method according to claim 20 wherein the standard key frame comprises a frame wherein the first modulator is driven at a constant percentage of full intensity across a display area.
- 5 22. A method according to claim 20 wherein the standard key frame comprises a frame wherein the first modulator is driven at full intensity across a display area.
- 10 23. A method according to claim 20 wherein the standard key frame comprises a frame wherein the first modulator is driven at a constant percentage of full intensity across a selected portion of a display area.
- 15 24. A method according to claim 20 wherein the standard key frame comprises a frame wherein the first modulator is driven at full intensity across a selected portion of a display area.
- 20 25. A method according to claim 20 wherein the standard key frame comprises a previously processed key frame.
- 25 26. A method according to claim 17 wherein calculating the current frame second modulation signal comprises:
comparing a plurality of pixels of the current frame second modulation signal with a second modulator range on a pixel by pixel basis; and,
updating the key frame first modulation signal and key frame luminance map if an average amount by which the pixels of the current frame second modulation signal are outside the second modulator range exceeds a
30 predetermined threshold.

- 21 -

27. A method according to claim 17 wherein calculating the current frame second modulation signal comprises:
- 5 comparing a plurality of pixels of the current frame second modulation signal with a second modulator range on a pixel by pixel basis; and,
- updating the key frame first modulation signal and key frame luminance map if a cumulative amount by which the pixels of the current frame second modulation signal are outside the second modulator range exceeds a
- 10 predetermined threshold.
28. A method according to claim 17 wherein calculating the current frame second modulation signal comprises:
- 15 comparing a plurality of pixels of the current frame second modulation signal with a second modulator range on a pixel by pixel basis; and,
- updating the key frame first modulation signal and key frame luminance map if an amount by which at least one of the pixels of the current frame second modulation
- 20 signal is outside the second modulator range exceeds a predetermined threshold.
29. A method for processing a frame for displaying on a display having a first modulator disposed to illuminate a second
- 25 modulator, the method comprising:
- obtaining image data for a current frame;
- retrieving a predetermined luminance map corresponding to a predetermined first modulation signal for the first modulator;
- and,
- 30 determining whether the second modulator is capable of modulating the luminance map to reproduce the an image of the current frame on the display, and if so, generating a second

- 22 -

modulation signal for the second modulator based on the image data for the current frame and the luminance map.

- 5 30. A method for processing a plurality of frames for displaying on a display having a first modulator disposed to illuminate a second modulator, the method comprising:
- obtaining image data for the plurality of frames;
 - calculating a key frame first modulation signal for the first modulator based on the image data for a key frame of the plurality of frames;
 - 10 calculating a key frame luminance map corresponding to light incident on the second modulator when the first modulator is driven by the key frame first modulation signal;
 - generating a second modulation signal for each of the plurality of frames based on the image data for each frame and the key frame luminance map.
 - 15
- 20 31. A computer program product comprising a medium carrying computer readable instructions which, when executed by a processor, cause the processor to execute a method of processing a series of frames for displaying on a display having a first modulator disposed to illuminate a second modulator, the method comprising:
- (a) receiving a key frame image;
 - 25 (b) calculating a key frame first modulation signal based on the key frame image;
 - (c) calculating a key frame luminance map of light from the first modulator incident on the second modulator; and,
 - (d) for each of a plurality of frames in the series of frames:
 - 30 (i) receiving a current frame image;

- 23 -

- 5 (ii) determining a current frame second modulation
 signal based on the current frame image and the key
 frame luminance map; and,
 (iii) selecting the key frame first modulation signal to be
 a current frame first modulation signal.
32. A system for displaying a series of frames on a display having a
first modulator disposed to illuminate a second modulator, the
system comprising a processor configured to:
- 10 (a) receive a key frame image;
 (b) calculate a key frame first modulation signal based on the
 key frame image;
 (c) calculate a key frame luminance map of light from the first
 modulator incident on the second modulator;
- 15 (d) determine a key frame second modulation signal based on
 the key frame image and the key frame luminance map;
 (e) drive the first modulator with the key frame first
 modulation signal and drive the second modulator with the
 key frame second modulation signal to generate the key
- 20 frame image on the display; and,
 (f) for each of a plurality of other frames in the series of
 frames:
 (i) receive a current frame image;
 (ii) determine a current frame second modulation signal
 based on the current frame image and the key frame
25 luminance map; and,
 (iii) drive the first modulator with the key frame first
 modulation signal and drive the second modulator
 with the current frame second modulation signal to
30 generate the current frame image on the display.